Comments and the Utah Division of Solid and Hazardous Waste Responses on the April 2002 Review Draft of the Deseret Chemical Depot, Tooele Chemical Agent Disposal Facility Human Health Risk Assessment

1. Comment. The Utah State DEQ DSHW's handling of the HRA shows a bias, a predisposition to permit TOCDF and find the TOCDF risks acceptable despite contrary evidence, which bias is exemplified in the state's decision to abandon its HRA protocol in selected areas and to later abandon its chosen risk assessment methodology after seeing the risk calculation results, as well as in the state's decision to declare the clearly unacceptable risk estimates in the HRA acceptable based on a political decision to use best case rather than reasonable worst case assumptions.

Response. The Division of Solid and Hazardous Waste (Division) disagrees that the health risk assessment (HRA) was biased to find the Tooele Chemical Agent Disposal Facility (TOCDF) risks acceptable. The HRA was prepared in accordance with the HRA protocol (Tetra Tech, 2001) and consistent with USEPA (1998) guidance. USEPA (1998) recommends a process for evaluating reasonable, not theoretical worst-case maximum potential risks to receptors posed by emissions from RCRA regulated units. Deviations from the HRA protocol were documented and were based on good risk assessment practice and sound technical judgment.

1a. Comment. The State proposed a HRA protocol and then took public comment on the protocol (ignoring most of commentors' recommendations) and finalized the protocol. The State then proceeded to calculate the TOCDF and CAMDS risk using this protocol, with some departures which are also of concern and noted elsewhere, and using data selected by the State. The State also selected the risk standards it would rely on. Risks for several chemicals, including mercury, 2 PAHs, DNOP and EMS were found to exceed the State adopted EPA risk standards. Then, after calculating the risks with its own procedures, data and standards, the State promptly abandoned the HRA methodology and declared its own risk results for numerous chemicals of potential concern (COPCs), those that exceeded the risk standards, to be meaningless and unreliable. The fact that the State abandoned its own approach only after seeing the risk results shows a bias and a predisposition to find in favor of the TOCDF operators, the Army and EG&G. The State could just as easily have discounted its finding that the risks were acceptable for those chemicals having risks calculated as within the risk standards based on the omissions and flaws in the HRA methods noted herein. However, the State only discounted the results for those chemicals found to exceed the standard.

Response. The Division disagrees with the comment. In accordance with the HRA protocol (Tetra Tech, 2001) and consistent with USEPA (1998) guidance, additional evaluation was conducted for chemicals that the risks exceeded target levels. The HRA protocol (Tetra Tech, 2001) specified the target levels for the HRA and how they would be interpreted:

> "If the calculated values for carcinogenic and noncarcinogenic endpoints are less than the target levels, the conclusion is that potential exposures to emissions are

safe. A calculated endpoint greater than the target level does not indicate an unsafe action or an unacceptable risk, but does indicate that additional evaluation or mitigation is warranted.

The additional evaluation will focus on the COPCs and exposure pathways whose endpoints exceed the target levels. Many of the parameters and assumptions in the risk assessment are anticipated to overestimate actual exposures. These parameters and assumptions can potentially be further refined based on site-specific conditions. If the endpoint for a potential future exposure pathway exceeds a target level, the conclusion of the additional evaluation may be to monitor for the completion of the pathway or to implement an environmental monitoring program. If the target levels are exceeded, mitigation options include modifying the operating conditions of the incinerators (e.g., feed rates, combustion conditions) or installing pollution control devices."

1b. Comment. Mercury risk is a prime example of this State bias. The State argues in the HRA that it can explain away the unacceptable hazard quotient calculated in the HRA for mercury based on the fact that the BRA is not currently in operation and is not yet approved for operation. But this is a fact that was known before the risk calculations were performed and if the State really believed that the BRA would never operate the BRA should have been omitted from the HRA at the protocol stage before the State saw the risk calculations results. The State has not permanently prohibited the BRA from ever operating based on mercury risk or for any reason and thus the risk is still real. Further, the mercury in the stack gases remains 9 times greater than that in the brine and BRA emissions regardless of whether the BRA operates or not, as explained below, because the scrubber brine can only remove 10% or less of the mercury from the combustion gases, so the BRA operation is a red herring. The State bias on mercury risk is also shown by the fact that the State did not require the mercury mass balance data from the TOCDF GB campaign to be submitted before the mercury emissions rate was determined to be the detection limit in the HRA. Based on the high levels of mercury found in GB ton containers, the fact that mercury as an element cannot be destroyed by incineration, and no TOCDF pollution control device currently installed or required by the State effectively removes mercury from the combustion gases, the State had every reason to believe that the mercury emissions rates would not be at the detection limit. At a minimum, TOCDF operators should have been required to confirm the ultimate fate of all the mercury found in the ton containers before selecting a mercury emissions rate for the HRA. Ms. Brenda Mugleston and her attorney, the undersigned, have reported to the State that much of the mercury ostensibly cleaned from the GB tons at TOCDF before incineration has not been accounted for in TOCDF's effort to do a mass balance, indicating substantially higher fugitive and/or stack emissions of mercury have occurred at TOCDF that reflected in the HRA. The TOCDF mercury risk is unacceptable and this fact does not change even if the BRA is never operated. The State has embraced information that purportedly supports discounting the mercury risk while ignoring the substantial information that shows that the mercury risk is real. This clearly shows the State's bias.

Response. The Division disagrees with the comment. Section 2.4.3.1 in the HRA protocol (Tetra Tech, 2001) discusses that the brine reduction area is currently inactive. The hazardous waste operating permit includes the brine reduction area. The draft permit renewal includes the brine reduction area. Therefore, potential emissions from the brine reduction area were appropriately included in the risk assessment because EG&G could elect to reactivate the brine reduction area. (As contrasted with the dunnage incinerator that was not included in the draft permit renewal and therefore was not evaluated in the HRA.) If the brine reduction area is reactivated, the risk assessment results will be used in designing a compliance test to reduce the uncertainty associated with potential mercury emissions.

After reviewing the HRA results, the Division requested that the TOCDF conduct a mercury mass balance for the four furnaces. The results of the mercury emission mass balance (EG&G, 2002) confirm that the HRA mercury emission rates for the GB campaign did not underestimate actual mercury emissions. This information will be added to the next draft of the HRA.

1c. Comment. The Utah DEQ and DSHW knows, among other reasons because they have been told by the Sierra Club, the Chemical Weapons Working Group, the Vietnam Veterans of America Foundation, FAIR and their attorneys, that TOCDF continues to experience repeated stack ACAMS alarms which have been acknowledged by the Army and EG&G to involve the actual release to the environment of some chemical that resembles chemical warfare agent to the ACAMS agent air monitor. The Army and EG&G have steadfastly refused to identify what those chemicals are that are admittedly released to the environment on an on-going basis at TOCDF. The Utah DEQ and DSHW have taken the three monkeys' approach to this problem. Considering the current HRA approach (apparently mandated by U.S. EPA, and properly so) adopted by UDEQ of analyzing a number of chemicals in the HRA expected to be emitted but which have not been actually detected in the limited testing done to date at the detection limits for those tests, and estimating the emissions of these chemicals at the detection limits, with resulting calculation of some extraordinary high and unacceptable risks, it is clearly unconscionable, not to mention arbitrary, capricious and contrary to law, for the UDEQ to close their eyes, ears and mouths regarding the risks posed by the admitted repeated TOCDF stack releases of yet to be identified chemicals, which are with virtual certainty in whole or part either actual chemical warfare agents or toxic byproducts thereof. Under the States' RCRA obligations, these emissions must be assumed to be agent until proven otherwise and must be identified and quantified as soon as possible and included in the HRA. No further TOCDF operation should be included until this task is completed. For the State to do otherwise is to recklessly disregard real dangers to workers, the public and environment, which shows a clear bias.

Response. As part of the oversight the Division conducts at the TOCDF, stack alarms are tracked and investigated. The TOCDF reports all stack alarms to the Division. With the exception of the release from the deactivation furnace system in May 2001, all stack ACAMS alarms have been confirmed to be something other than agent. The potential emissions of unidentified organic compounds, some of which may cause ACAMS

alarms, are a source of uncertainty in the risk assessment methodology. In accordance with USEPA (1998) guidance, total organic emissions were measured during the TOCDF trial burns and the results evaluated in the risk assessment. The results are discussed in Section 4.3.1.2 of the draft health risk assessment: Due to the small fraction of unknowns in the TOCDF emission, "The uncertainty associated with non-quantified organics indicates a slight (less than one order of magnitude) underestimation of risk and hazard due to organic compounds."

The TOCDF does experience false-positive stack ACAMS alarms. The Division has requested that the TOCDF attempt to devise a method to identify and quantify chemicals that cause the false positive alarms. No satisfactory methodology has been identified. The TOCDF does test substances that are used on-site for their effects on the ACAMS and has identified many substances that can give false ACAMS alarms. Substances that have a similar gas chromatograph column retention time as chemical agent can cause false ACAMS alarms. The gas chromatograph column retention time is not correlated with toxicity. Onions and after-shave are examples of innocuous substances that can cause an ACAMS to alarm. No changes were made to the HRA in response to this comment.

1d. Comment. The State departed from EPA guidance and its own protocol on a number of factors that resulted in a lower risk estimate. An example is the omission in the BRA of any cancer risk from ingesting chromium, a known carcinogen. The State decided to ignore EPA guidance which dictates that ingested chromium be assumed as carcinogenic as inhaled chromium given current data gaps. The State decided, contrary to this EPA guidance, to treat ingested chromium as having zero cancer risk. Departing from EPA guidance to lower the risk estimate shows a bias.

Response. The Division disagrees that it deviated from USEPA (1998) for the evaluation of chromium. In USEPA (1998), exposure route-to-route extrapolations were used to fill toxicity data gaps. For instance, if an oral reference dose (RfD) was available and an inhalation reference concentration (RfC) was not, an RfC was estimated by extrapolation from the RfD. When the USEPA (1998) guidance was being drafted, the USEPA received several comments objecting to this procedure because for some chemicals the available data does not support extrapolation. Chemicals may cause injury where they enter the body (for instance, the lungs) that can't be extrapolated to other entry points (for instance, the stomach). The extrapolation procedure is useful for identifying chemicals without toxicity values that may warrant additional investigation. USEPA (1998) recommends that the assumptions regarding route-to-route extrapolations, such as was done for estimating an oral cancer slope factor for chromium, be verified. The verification is summarized in the following paragraph.

USEPA (1998) extrapolated an oral slope factor for chromium from the inhalation unit risk for hexavalent chromium. Hexavalent chromium is a known human carcinogen via inhalation (Integrated Risk Information System, 2002). Hexavalent chromium was not evaluated as an oral carcinogen because hexavalent chromium is only carcinogenic by

inhalation (USEPA, 1998. Toxicological Review of Hexavalent Chromium in Support of Summary Information Presented on the Integrated Risk Information System).

Stack emissions from the TOCDF have been tested for chromium. All chromium emissions are protectively assumed to be hexavalent for the HRA, even though USEPA (2001) suggests that hexavalent chromium is unlikely to be emitted from incinerators like the TOCDF.

1e. Comment. The State arbitrarily ignores important evidence of unacceptable risk from dioxin presented in the EPA Dioxin Health Assessment on the excuse that it is a draft and then relies heavily on other EPA draft documents for the HRA. This double standard shows a bias.

Response. The Division disagrees with the comment. Dioxins were evaluated in accordance with the most recent USEPA (1998) guidance for conducting health risk assessments for hazardous waste combustors. Division staff has reviewed the draft USEPA dioxin assessment (USEPA, 2000) but disagree that the document concludes that dioxin risks are unacceptable. No changes were made to the HRA in response to this comment.

1f. Comment. The State's bias was clearly demonstrated during the preparation of the 1996 predecessor HRA for TOCDF during which preparation the infant was calculated to receive a dioxin dose from TOCDF alone of 50 pg/kg/day (50 times greater than the EPA RfD and the ATSDR MRL upon which calculation the State promptly ordered the infant deleted from the HRA before that result ever became public. That risk to the infant would never have been made public had it been left to the State and its prior contractors. Only the diligent inquiry of concerned citizens resulted in that risk to the infant being made known to the public. The current HRA carries on in that not so venerable tradition.

Response. The comment is incorrect. No drafts of the 1996 *Screening Risk Assessment* contained a reference dose for dioxins. Potential dioxin exposures to infants were evaluated in a draft of the *Screening Risk Assessment* using a comparison to background exposure. The conclusion of this comparison was that potential infant exposures to dioxin were acceptable. The discussion was deleted from subsequent drafts because the Division did not believe that the comparison provided useful information and USEPA no longer recommended that approach. No changes were made to the HRA in response to this comment.

2. Comment. The HRA evidences, notwithstanding its shortcomings noted herein, that operation of TOCDF poses an unacceptable risk by EPA standards, but the state improperly states in the HRA that these risks will be deemed acceptable.

Response. The DSHW disagrees that the operation of TOCDF poses an unacceptable risk. The comment asserts that a calculated risk or hazard greater than a target level is interpreted as an unacceptable risk, contrary to USEPA (1998) and the HRA protocol (Tetra Tech, 2001) (see response to comment 1). Also please note that the Division has

the authority and responsibility to set target levels, not the USEPA. Regarding the results of the HRA, the Division and the USEPA target levels are identical.

2a. Comment. The HRA does calculate a dose of dioxin for the breast fed infant of greater than 1.7 pg/kg/day which exceeds the ATSDR MRL and EPA Office of Water (which are identical) of 1 pg/kg/day and exceeds more so any RfD which EPA might set today based on the currently available scientific information on dioxin toxicity. The State has not been honest with the public regarding the fact that the EPA Office of Water does have and uses an RfD for dioxin non-cancer effects of 1 pg/kg/day TEQ as does the ATSDR (via their MRL), and the new literature on dioxin and the new EPA Dioxin Health Assessment, draft or not, provide no basis for making this number less protective (larger), but do provide a basis for making the number considerably smaller. There is no scientific or public health rationale that justifies continued exposure of human infants, children and adults to levels of hazardous waste and contaminants known to cause harm or to be virtually certain to cause harm, as is the case here with dioxin. Using the 1 pg/kg/day RfD for total dose for the infant is much more defensible than what the State has done, which is to adopt an arbitrary 10% more exposure is ok standard when the existing infant dioxin exposure is horrendous. Using a smaller RfD value based on the recent studies, the greater sensitivity of the infant and additional unknowns regarding dioxin impacts on developing organisms is more defensible yet. The State ignores the recent Arkansas (Cramner) studies and Dutch studies of infants, children and adults which show neurological and diabetes like adverse effects at levels of dioxin exposure already exceeded by most infants and children and many adults. The State is allowing the infant, already more than 60 times overexposed via the average infant 60 pg/kg/day current dioxin exposure, to have an additional dioxin exposure of 6 pg/kg/day from TOCDF and CAMDS alone. Under this strange logic, the public health protection standards adopted by the State is essentially the more you have already been exposed from existing sources, the more the State will allow you to be exposed from new sources. This is a recipe for disaster by allowing an ever increasing dioxin exposure that would never be declared to be too high even if the entire population was receiving a lethal dose. This approach has nothing to do with science, public health, logic or ethics. This approach is simply playing politics with public health, victimizing further an already victimized infant population, a population that cannot speak for or defend itself, for the benefit of corporate profit and agency convenience. This is, in a word, unconscionable.

Response. The Division disagrees with the comment. Some dioxins are very toxic and trace levels have contaminated portions of our food supply. Determining a safe level of exposure to dioxins is controversial and has many uncertainties. One of the controversial issues is whether the USEPA approach of protection from dioxin's cancer effects is adequate for protection of non-cancer effects. The potential for non-cancer effects is typically evaluated by comparison to a reference dose. USEPA publishes reference doses in the IRIS or HEAST databases. Dioxins do not have a reference dose in IRIS or HEAST. However, in the dioxin reassessment, USEPA (2000) questions whether the reference dose approach is appropriate for dioxins.

In the HRA, dioxins were evaluated in accordance with USEPA (1998). The USEPA Office of Solid Waste (1998a) does not recommend using the reference dose (1 pg/kg-day) from the USEPA Office of Water. Similar comments regarding dioxins were received on the draft final HRA protocol. The responses included in the Final HRA protocol (Tetra Tech, 2001) follow:

> The potential health effects from exposure to 2,3,7,8-substituted chlorinated dioxins or furans are evaluated using cancer as an endpoint in accordance with U.S. EPA guidance (referenced as U.S. EPA 1998b in the draft protocol). A reference dose is required to evaluate the potential for noncancer effects. The U.S. EPA toxicological databases for risk assessment, Integrated Risk Information System (IRIS) and Health Effects Summary Tables (HEAST), do not list a reference dose for 2,3,7,8-substituted chlorinated dioxins or furans. The U.S. EPA National Center for Environmental Assessment (NCEA) recommends interim toxicity values for chemicals not in IRIS or HEAST. NCEA does not recommend the use of the 1 pg/kg-day as a reference dose for 2,3,7,8-tetrachlorodibenzo(p)dioxin.
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> The DSHW has reviewed the U.S. EPA 2000 dioxin reassessment document that is undergoing peer review. Some of the methods proposed in the 2000 reassessment are a departure from current U.S. EPA methods. Given the controversy and uncertainty surrounding this issue, the DSHW does not anticipate adopting the findings of this document prior to the document being finalized by the U.S. EPA. The health risk assessment protocol follows current U.S. EPA recommendations for evaluating health risks from potential exposures to dioxin-like chemicals from hazardous waste combustion facilities (referenced as U.S. EPA 1998b in the draft protocol).

The rationale for the 10 percent of background standard is not based on the level of protectiveness of existing dioxin exposures (the commentor asserts that background dioxin levels are unsafe). The rationale is based on the premise that 10 percent is an insignificant addition to existing exposures. The majority of the calculated infant dose of dioxins was based on detection limits (these dioxins might not be present at all in emissions) because very few toxic dioxin and furan congeners have been detected. The explanatory text from the HRA protocol (Tetra Tech, 2001) follows:

> In some cases, noncancer effects may be significant to infants even when dioxin emissions are lower than the national average background exposure level. However, this comparison to national average background levels was determined based on several policy considerations made by U.S. EPA. This methodology is currently recommended by U.S. EPA and will be implemented in the HHRA.
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> The target level for evaluating noncarcinogenic PCDD and PCDF exposures is 10 percent of the average dose attributable to background exposures in the United States. An HQ could not be calculated because of the lack of consensus on a safe dose (i.e., an RfD) for dioxin-like chemicals. The U.S. EPA (1998a)

recommended approach is to compare the potential dose attributable to DCD emissions to the dose attributable to background. An additional 10 percent exposure added to existing (background) exposures is judged unlikely to result in any additional potential for adverse effects.

2b. Comment. The HRA does calculate a mercury non-cancer risk that exceeds the EPA standard of a hazard quotient of 0.25 based primarily on emissions of mercury from the Brine Reduction Area (BRA). The BRA was estimated as accounting for 93% of the TOCDF mercury risk calculated in the HRA. However, the BRA mercury emissions rate was calculated based on the detection limit (DL). The DL was used apparently because, notwithstanding that mercury was detected via sampling and analysis in the actual brine, mercury was not detected in the BRA emissions during the limited sampling performed. But the mercury emissions from the stack would be expected to be considerably greater than from the BRA (the reverse of what the HRA calculated) because mercury is not efficiently removed from the stack gases and the scrubber brine would not be expected to remove more than 10% of the mercury at best. Thus the stack gases would have 9 times or more the mercury contained in (removed from) the brine and the stack mercury emissions and risk should be correspondingly greater than the mercury emissions from the BRA. Thus, the HRA calculation of an unacceptable mercury risk is actually an understatement of the risk. The mercury risk is greater than the HRA calculates because 1) mercury emissions will be greater than the detection limit rate relied on in the HRA due to high mercury levels found in some ton containers and agent and omission in the HRA of any data from the MPF burning these high mercury tons and omission in the HRA of the TOCDF mercury mass balance data which apparently indicates substantial releases of mercury to the environment; 2) the portion of mercury emitted as fugitive emissions rather than stack emissions still contributes to the risk but was excluded from the BRA; 3) the stack gas will contain 9 times or more the mercury that the brine contains and this fact was ignored in the HRA; 4) existing mercury levels in water, fish, soil and food in Utah were ignored or assumed to be zero. The State argument offered in the HRA to explain away the unacceptable hazard quotient calculated in the HRA for mercury that the BRA is not currently in operation and is not yet approved for operation is unpersuasive because this is a fact that was known before the risk calculations were performed and if the State really believed that the BRA would never operate the BRA should have been omitted from the HRA at the protocol stage before the State saw the risk calculations results. The State has not permanently prohibited the BRA from ever operating based on mercury risk or for any reason and thus the risk is still real. Further, the mercury in the stack gases remains 9 times greater than that in the brine and BRA emissions regardless of whether the BRA operates or not so the BRA operation is a red herring. The TOCDF mercury risk is unacceptable and this fact does not change even if the BRA is never operated.

Response. The conclusion of the HRA is that mercury emissions are unlikely to cause adverse health effects. The Division agrees that stack emissions of mercury are expected to be greater than mercury emissions from the brine reduction area (BRA). The commenter interprets this information to indicate that mercury stack emissions were underestimated. However, the accurate explanation is that mercury emissions for the

BRA were overestimated. After the HRA was released for comment, a typographical error was discovered in the BRA mercury emission rates. The BRA mercury emission estimates for the TOCDF GB campaign were overestimated by 1000 times. This error results in 1000-fold overestimation of the mercury hazard quotient. The TOCDF GB BRA emission rates were corrected in the final draft of the HRA.

2c. Comment. The HRA also calculates an unacceptable risk from 2 polycyclic aromatic hydrocarbons (PAHs), whose emissions rates were assumed to be the detection limit because the State has found no data detecting these compounds in TOCDF, JACADS or CAMDS emissions. After calculating this unacceptable risk the State promptly discounted the unacceptable hazard quotients because the State believes the PAHs will not actually be present in emissions and the PAHs will be substantially metabolized. But the members of the family of PAHs are commonly found in incinerator emissions and it is not unrealistic to expect the 2 PAHs in question to be present at a significant fraction of the detection limit. If there was legitimate scientific reason to rule out the presence of these PAHs in TOCDF emissions, that fact should have been raised prior to the State seeing the results of the risk calculations. If the State was sincerely concerned with risk from chemicals actually known to be present in TOCDF emissions it would have required the Army to determine the identity and toxicity of the chemicals known to be repeatedly emitted from the TOCDF common stack that set off the stack ACAMS alarms (the chemical agent air monitors), so that the risk from these emissions could be calculated in the HRA. The State has knowingly ignored these emissions for years.

Response. Whether the high molecular weight polyaromatic hydrocarbons (PAHs) dibenz(a,h)anthracene and indeno(1,2,3-cd)pyrene are present in stack emissions is an uncertainty acknowledged in the HRA. While other low molecular weight PAHs are found in the stack emissions, the fact is that in over 150 stack tests these two high molecular weight PAHs have not been detected at JACADS, CAMDS, or TOCDF. Nor have these PAHs been detected in environmental samples collected from Rush Valley. The available empirical data supports that these two PAHs are not present in stack emissions from the TOCDF at any appreciable concentration and additional environmental monitoring will be conducted to confirm this conclusion. No changes were made to the HRA in response to this comment.

2d. Comment. The HRA calculates a number of cancer risk standard exceedances in addition to the non- cancer risk exceedances. Considering all of the factors excluded from the HRA that would have increased cancer risk, there is no reason to assume that these cancer risk exceedances can be discounted based on uncertainties or conservative assumptions used in the HRA for what was addressed.

Response. The Division disagrees with the comment. The comment provides no data or calculations to support the assertion that risks and hazards were significantly underestimated in the HRA. The data and rationale for concluding that emissions from the TOCDF are acceptable are documented in the HRA. No changes were made to the HRA in response to this comment.

2e. Comment. The risks calculated in the HRA for EMS, DNOP, PAHs and mercury are clearly unacceptable and were calculated based on the procedures and assumptions selected by the State and should not be discounted based on after the fact (after the results are known) self-serving criticism by the State of the States' own methods. If the emission of these chemicals, or any one of them, at the dangerous levels calculated in the HRA cannot be scientifically ruled out, as appears to clearly be the case from the analysis in the HRA itself, then, based on the State's obligation under RCRA to ensure protection of public health and the environment and to ensure trial burn and long term operations do not pose an imminent hazard to the public (which includes workers) or the environment, consistent with the precautionary principle, the permit must be denied based on these unacceptable risks.

Response. The HRA concludes that the potential risks and hazards are acceptable and human health is protected. The commenter appears to object to, or doesn't understand, the common risk assessment practice of using simplifying and conservative assumptions to streamline the risk assessment process and to focus resources on the chemicals that are more likely to be a threat to human health. As discussed in response to comment 1a, if the calculated risks exceed the target levels, the assumptions are reevaluated and potentially refined. The Division could have performed detailed analyses of all the exposure assumptions, emissions data, fate and transport, and toxicology for each of the approximately 300 chemicals prior to calculating the cancer risks and hazards. The conclusions would be the same, but evaluating every chemical would have required much more time and resources than evaluating only the five chemicals that had calculated risks and hazards greater than the target levels. No changes were made to the HRA in response to this comment.

3. Comment. The HRA omits emissions sources, exposure routes, toxicity data, and risk standards that if included would, with virtual certainty, result in risks estimates that would exceed EPA target levels and would represent unacceptable risks by any reasonable standard.

Response. The comment does not provide any data or calculations to support the assertion that risks would be unacceptable. No changes were made to the HRA in response to this comment.

3a. Comment. The HRA completely omits risk from fugitive emissions, which is a major source of both chemical warfare agent emissions and toxic metals emissions at TOCDF.

Response. The HRA concludes that fugitive emissions are unlikely. As discussed in Sections 2.2.1 and 2.2.1.4 of the HRA protocol (Tetra Tech, 2001), the HVAC is designed and operated to prevent fugitive emissions. No changes were made to the HRA in response to this comment.

3b. Comment. The HRA completely omits risk to workers from exposure to chemical warfare agents, metals and other contaminants during the course of their job performance, including but not limited to exposures that have been documented from the DFS waste and the MPF waste, hot cut outs, stack plume exposures, agent migration, and incidents involving leaking munitions. It is a fallacy to assume that worker protection is not part of RCRA requirements and the administrative rules for the Division, as implied by Division of Solid and Hazardous Waste representative on June 25, 2002, at the public information meeting. In a letter received from the Division of Solid and Hazardous, June 25, 2002, it states: "The DSHW agrees that worker safety is an important consideration." (Source: Letter from: Dennis R. Downs, Executive Secretary Utah Solid and Hazardous Waste Control Board; dated: June 24,2002; To Cindy King, Utah Chapter of Sierra Club).

Response. The Division does agree that worker safety is an important consideration when evaluating hazardous waste permit conditions. A worker exposure scenario was evaluated in the HRA for workers that might be incidentally exposed to metals and chemical agents in stack emissions. The Division does not have jurisdiction for workers who might be exposed as part of their normal job duties. A similar comment regarding occupational exposures was received on the HRA protocol and the following clarification was given (Tetra Tech, 2001):

> "The health risk assessment will not evaluate occupational exposures and accidental releases because they are beyond the scope of a RCRA risk assessment (referenced as U.S. EPA 1998b in the draft protocol). Worker exposures that may occur as part of a workers normal job duties are regulated by the Occupational Safety and Hazard Administration."

3c. Comment. The HRA completely omits dioxin emissions from burning dunnage (e.g., chemical agent contaminated wood, plastic and charcoal) although burning dunnage in the metal parts furnace and deactivation furnace has been considered and has not been ruled out.

Response. The HRA did not evaluate emissions from dunnage because there are no emissions occurring from the treatment of contaminated wood, plastic, DPE suits, or charcoal. Contaminated wood, plastic DPE suits, and charcoal are currently in secure storage and potential treatment methods for these wastes are being evaluated. Whatever method is selected for the treatment, an evaluation will be conducted to ensure compliance with applicable regulations, and to ensure the treatment method is protective of human health and the environment. No changes were made to the HRA in response to this comment.

3d. Comment. The HRA omits emissions data from burning agent ton containers that were found to contain high levels of mercury, and omits TOCDF mercury mass balance data for those high mercury tons, resulting in use of detection limits for mercury emissions rates which substantially underestimates mercury emissions which have occurred from the stack and via fugitive emissions.

Response. The HRA included emissions from burning ton containers that contained high levels of mercury. The LIC 1 miniburn, where the highest emissions of mercury were observed, was the source of the emission rate for the HRA. Fugitive emissions are not expected because of the HVAC system. As discussed in response to comment 1b, mercury emissions were not underestimated in the HRA. No changes were made to the HRA in response to this comment.

3e. Comment. The HRA omits risk estimates from stack emissions known to occur at TOCDF which cause ACAMS (agent air monitor) alarms and which are thought by the Army to be non-agent. These emissions have yet to have their chemical identities or toxicity determined.

Response. Please see response to comment 1c.

3f. Comment. Risk from acute (short term) exposures to chemical warfare agent are completely omitted from the HRA. Thus risk to workers and the public from agent release during accidents or incidents, of which there have been numerous examples to date at TOCDF, is omitted, as is risk to workers and the public from non-stack (fugitive) releases of agent which has been reported by workers to have occurred on an on-going basis at TOCDF (e.g., releases from the DFS HDC bin enclosure).

Response. As discussed in response to comment 3n, an evaluation of accidents is beyond the scope of the HRA. An evaluation of acute exposure, assuming that chemical agent is actually released from the stack at the Allowable Stack Concentration, using the recently released AEGLs will be documented in final HRA. The conclusion of this evaluation is that potential acute exposures would not result in adverse health effects. HDC bin workers potentially exposed to fugitive emissions as part of their normal job duties are protected by the Occupational Safety and Hazard Administration. The site monitoring and perimeter monitoring data does not indicate that there have been any significant releases via fugitive emissions.

3g. Comment. The HRA omits any risk standard or toxicity estimate for dioxin non-cancer effects such as a reference dose (RfD) or minimal risk level (MRL) despite the fact that such an RfD is available from the U.S. EPA Office of Water and such an MRL is available from the federal Agency for Toxic Substances and Disease Registry (ATSDR). The State, ignoring the EPA OW and ATSDR 1 pg/kg/day virtually safe dose for dioxin for adults, has taken the position that it has not determined what would be a virtually safe dose of dioxin for an infant or adult but has nonetheless represented in the risk assessment that it is safe for the infant to be exposed to an additional 6 pg/kg/day dioxin toxic equivalents (TEQs) from TOCDF on top of the average infant dioxin exposure of 60 pg/kg/day TEQs from other existing dioxin sources. The State's omission of a dioxin virtually safe dose is a knowing and intentional political decision to avoid admitting to the public that the population is already overexposed to the ultra toxic chemical dioxin and consequently the TOCDF risk is unacceptable and the TOCDF permit should be denied because TOCDF emissions add additional dioxin exposure to an already unacceptable total dioxin exposure.

Response. See response to comment 2a.

3h. Comment. The HRA omits the developing fetus as a sensitive population.

Response. This comment is incorrect. The HRA identifies the developing fetus as a sensitive population (Tetra Tech, 2001). USEPA references doses are intended to protect sensitive members of the population. If the critical toxic effect (the toxic effect on which the reference dose is based) is based on developmental effects, or developmental effects potentially occur at doses higher than the dose associated with the critical effect, the developing fetus is protected. No changes were made to the HRA in response to this comment.

3i. Comment. The HRA should but does not address the risks from sensitization effects for organophosphates (nerve agents and pesticides) and potentiation/synergistic effects for same and other TOCDF emissions including dioxin.

Response. Little or no toxicological data is available to evaluate potentiation or synergistic effects. USEPA (1998) guidance recommends that cumulative exposures to chemicals with similar modes of action (for instance organophosphate pesticides and organophosphate nerve agents) or the same target organs be evaluated by assuming toxic effects are additive. For chemicals that do not have similar target organs, assuming additive toxic effects is not required. The reference doses for organophosphates are based on studies with repeated exposures that would integrate any sensitization effects. No changes were made to the HRA in response to this comment.

3j. Comment. The emissions estimates for TOCDF should be based on and include, but are not based on nor do they include, a measurement of the total dioxin-like emissions and total dioxin-like toxicity of a representative sample of stack gas (for example, using a bioassay approach).

Response. The emission rates in the HRA include all dioxin-like chemicals (chemicals with a U.S. EPA 2,3,7,8-tetrachlorodibenzo(p)dioxin toxic equivalency factor [TEF]) from a representative sample of stack gas. The toxicity of the dioxin-like chemicals are evaluated by calculating 2,3,7,8-tetrachlorodibenzo(p)dioxin toxic equivalents (TEQs) in accordance with USEPA guidance (1998). Bioassays (exposing a living organism to stack gas and evaluating adverse health effects) were not conducted for any of the trial burns and are not recommended in USEPA (1998) guidance. Bioassays would have serious methodological challenges such as overcoming the oxygen deficient stack emissions or assigning any observed toxicity to the appropriate chemical. No changes were made to HRA in response to this comment.

3k. Comment. The emissions estimates for TOCDF do not but should include inter alia a measurement of the total toxicity of a representative sample of stack gas from each waste stream (for example, using a bioassay approach).

Response. The HRA was conducted in accordance with USEPA (1998) methodology. These methods do not include the direct use of bioassays. Bioassays do form the basis for many of the reference doses and cancer slope (potency) factors derived by the USEPA. Also, please see the response to comment 3j. No changes were made to the HRA in response to this comment.

3l. Comment. The emissions estimates for TOCDF should but do not include an identification and measurement of each of the PICs in a representative sample of stack gas (for example, using the multi-dimensional gas chromatography approach described by the 1998 EPA report on identifying a target analyte list for hazardous waste incinerators).

Response. A multi-dimensional gas chromatograph is a research-grade instrument that is not commercially available. The HRA was conducted in accordance with USEPA (1998). The trial burn emissions are collected and analyzed in accordance with USEPA or Division approved methods. The Division requires that tentatively identified compounds (compounds that were detected in emissions but were not being looked for) be reported and their concentrations estimated. In addition, a total organic emissions analysis is conducted to evaluate the potential for emissions of non-target organic chemicals. The Division presumes that the comment is referencing *Development of Hazardous Waste Incinerator Target Analyte List of Products of Incomplete Combustion* (EPA/600/R-98/076). This document was prepared as part of the U.S. EPA National Risk Management Research Laboratory's long-term research plan. The Division's understanding is that the USEPA considered the findings of this study in preparing USEPA (1998). No changes were made to the HRA in response to this comment.

3m. Comment. The HRA does not provide for emissions characterization by measurement rather than estimate in some cases where technology allows measurement.

Response. When available, the emission estimates were based on actual measurements during trial burns. The health risk assessment protocol estimated emissions when site- or waste-specific emissions data were not available. The estimates were based on emissions data from similar facilities that treat similar waste. This procedure (that is, predicting future emissions) facilitates decision-making prior to a permittee committing resources for a process that may ultimately not be permitted. The methods used for extrapolating emission rates for the health risk assessment protocol are conducted in accordance with USEPA guidance (1998) and are more likely to overestimate actual emissions. This assumption will be verified with site- and waste-specific trial burn measurements of emissions, and the HRA will be updated as necessary. No changes were made to the HRA in response to this comment.

3n. Comment. The HRA should but does not consider the accident risks at TOCDF using an analysis based on the approach of Professor Charles Perrow based on his studies of complex systems and in light of the new agent toxicity and accident analysis regarding the Umatilla, Oregon sister CDF by Dr. Black.

Response. An evaluation of accident risk is beyond the scope of the HRA. Accident risks are evaluated by the *Tooele Chemical Agent Disposal Facility Quantitative Risk Assessment*, SAIC Report 96/2600 (Science Applications International Corp., 1996). No changes were made to the HRA in response to this comment.

3o. Comment. The HRA should but does not include an analysis of EPA and industry data on organophosphate pesticides showing surprising toxicity at lower doses, e.g. U shaped dose response curves.

Response. The Division is not aware of the data described in the comment and no reference was provided. The TOCDF and CAMDS are not permitted to treat hazardous wastes containing organophosphate pesticides. If organophosphate pesticides are determined to be chemicals of potential concern, toxicity values will be obtained from the Integrated Risk Information System (IRIS) or Health Effects Assessment Summary Tables (HEAST) in accordance with the recommendations of USEPA (1998). No changes were made to the HRA in response to this comment.

3p. Comment. The HRA should but does not consider combined and cumulative exposures to pesticides together with nerve agent emissions from TOCDF.

Response. The TOCDF and CAMDS are not permitted to treat hazardous wastes containing pesticides. The exposure sources evaluated as part of the risk assessment process were selected based upon current USEPA guidance (1998). Pesticides were not included in the risk characterization calculations. The health risk assessment uses a cumulative hazard index of 0.25 (75 percent more stringent than what is presumed safe) that is intended to account for other potential exposures that were either not identified or quantified. No changes were made to the HRA in response to this comment.

3q. Comment. The HRA/PP should but does not include a careful analysis of chemical warfare agent toxicity including consideration of the recent GAO study, the Congressional reports on Gulf War illness, the Army and NRC studies on upgrading agent toxicity estimates, the Dugway sheep kill data available from the Army on CD-ROM, and the new CDC and EPA agent toxicity and exposure estimates and standards.

Response. The toxicity benchmarks used in the risk assessment are the best current estimates available. The chemical agent oral toxicity values were derived by the U.S. Army Center for Health Promotion, Prevention, and Medicine consistent with USEPA methods. The oral toxicity values have been peer-reviewed and accepted by the Division for interim use.

The CDC has proposed new airborne exposure limits for VX (FR, January 8, 2002). The HRA toxicity values for chronic vapor exposures were based on the current CDC general population limits (FR, March 15, 1988). The Division has conducted a comparison using the proposed general population limit for VX. Predicted exposure concentrations to VX are lower than the proposed general population limit. If CDC's proposed airborne

exposure limits are adopted, the HRA conclusion of no adverse health effects from potential emissions of chemical agents will stay the same.

The USEPA finalized the interim acute exposure guideline levels (AEGLs) for VX too late to be included in the April 2002 draft of the HRA. An evaluation of acute exposures to VX will be documented in the next draft of the HRA. The maximum predicted one-hour air concentration for VX is lower than AEGL-1 indicating that potential VX emissions will have no adverse health effects.

3r. Comment. The HRA should but does not include emissions estimates based on trial burns of longer duration than standard trial burns based on recent studies showing short term trial burns give biased low emission measurement.

Response. The comment does not provide a reference for the "recent studies". When available, the health risk assessment relies on emission data from Division-approved trial burns. The trial burn emissions may not be representative of long-term emissions because trial burns are challenges to the furnaces that can result in higher-than-normal emissions. Trial burn data from JACADS were also used and these trial burns were conducted in accordance with USEPA guidance and with regulatory oversight. No changes were made to the HRA in response to this comment.

3s. Comment. The HRA is not based on valid data showing emissions when burning undrained and gelled agent munitions, but incidents at TOCDF indicate such emissions can be dramatically higher than when burning drained munitions.

Response. The Division disagrees with the comment. The HRA is based on valid emissions data. Burning gelled agent has not resulted in higher emissions of chemicals of potential concern. Some of the emissions data for the HRA were extrapolated from other facilities and verification will be conducted in future trial burns. Agent feed rates are based upon the number of chemical-munitions-units and waste mass per unit time, so the trial burn test data available is representative of the current operations. Due to the design of the MPF and DFS, waste agent is essentially evaporated in the primary chamber. The secondary combustion chamber (or DFS afterburner) is mostly responsible for the actual waste destruction. Due to unit and mass feed rate limitations, the flow rate of agent to the secondary combustion chambers is equal to the agent flow rates demonstrated during the trial burn tests. Exceeding the permitted feed rates (that are based on trial burns) could result in an increase in emissions compared to the trial burn and would be a violation of the operating permit. The potential increase in emissions from accidental overfeeds are included in the upset factor used in the HRA. Please note that the proposed trial burn for the TOCDF deactivation furnace treating VX munitions includes burning undrained rockets. No changes were made to the HRA in response to this comment.

3t. Comment. The HRA should but does not consider risk to workers based on the recent worker exposure and injury incidents at the Umatilla CD facility, the Pine Bluff CD facility, and the Anniston CD facility.

Response. The incinerators at Umatilla, Pine Bluff, and Anniston are not treating hazardous waste yet so the relevance of exposures or injuries to hazardous waste treatment at TOCDF is unclear. As discussed in response to comment 3b, the HRA does not evaluate occupational accidents and exposures because they are beyond the scope of a RCRA risk assessment (USEPA, 1998). The Occupational Safety and Hazard Administration regulates worker exposures that may occur as part of a worker's normal job duties. No changes were made to the HRA in response to this comment.

3u. Comment. The HRA should but does not base agent emissions on actual measurements using a method validated by EPA for stack gas measurement of agent emissions, including a careful analysis of the emissions during repeated stack alarms at TOCDF.

Response. The HRA did not base agent emissions on actual measurements. Instead, the Division chose to use the allowable stack concentration (ASC) that is higher than actual measurements (based on the detection limits; chemical agents have not been detected). The USEPA has not validated an analysis method for chemical warfare agents. The Division has determined, and the Center for Disease Control and USEPA agree, that the stack sampling and analysis methods for chemical warfare agents are acceptable. The Division has requested that the TOCDF attempt to devise a method to identify and quantify chemicals that cause the false positive alarms. No satisfactory methodology was identified. The TOCDF does test chemicals that are used on-site for their effects on the ACAMS and has identified many chemicals that interfere with the ACAMS. No changes were made to the HRA in response to this comment.

3v. Comment. The TOCDF HRA should but does not consider the cumulative and combined impacts of open burning/open detonation (OB/OD) past, present and future with the TOCDF and other area emissions because both TOCDF and OB/OD and other area pollution sources emit persistent toxic compounds that will not quickly degrade in the environment and will ultimately pose a combined threat via this persistence (for decades) and simultaneous presence in the food chain notwithstanding that UDEQ may not allow OB/OD simultaneous with TOCDF operation.

Response. In accordance with USEPA (1998) guidance, the HRA evaluates the cumulative and combined impacts of RCRA-regulated emission sources from Deseret Chemical Depot. The target levels (for instance, the hazard index of 0.25) selected for the HRA are intended to compensate for unidentified or unquantified exposures such as exposures attributable to past waste management activities. In addition, soil and vegetation samples taken on and surrounding the facility, including the results of the 1996 Agricultural Impact Assessment and RCRA Facility Investigations, indicate that persistent toxic compounds attributable to OB/OD have not impacted Deseret Chemical Depot or the surrounding area. No changes were made to the HRA in response to this comment.

3w. Comment. The HRA should but does not include an assessment of the total local impact of TOCDF emissions together with existing levels and continuing emissions of air

pollutants from all other area sources, particularly in light of recent findings in a study by the Physicians for Social Responsibility, the National Environmental Trust, and the Learning Disabilities Association of America that concluded that air in Tooele County to be the most toxic in the nation, and polluted enough that local children could be seriously harmed by inhalation of the contaminants.

Response. In accordance with USEPA (1998) guidance, the HRA evaluates the cumulative and combined impacts of RCRA-regulated emission sources from Deseret Chemical Depot. The target levels (for instance, the hazard index of 0.25) selected for the health risk assessment are intended to compensate for unidentified or unquantified exposures. The Division is unaware of any studies that have identified a higher incidence of health effects attributable to air contaminants in Tooele County. No changes were made to the HRA in response to this comment.

3x. Comment. The HRA should but does not include an assessment of the total non-local impact of TOCDF emissions together with existing levels and continuing emissions of air pollutants from all other national air pollution sources, particularly in light of recent findings in a study by Dr. Barry Commoner that concluded that long range atmospheric transport of persistent organic pollutants from air pollution sources in the United States was causing contamination of native lands, ecosystems and the foodweb in northern Canada, and similar studies showing that colder climate areas are the ultimate environmental sinks for persistent organic pollutants and are consequently developing dangerous levels of contamination.

Response. Evaluating impacts of persistent organic pollutants in northern Canada is beyond the scope of the HRA and the jurisdiction of the Division. In accordance with USEPA (1998) guidance, the TOCDF health risk assessment evaluates the cumulative and combined impacts of RCRA-regulated emission sources from Deseret Chemical Depot. The target levels (for instance, the hazard index of 0.25) selected for the health risk assessment are intended to compensate for unidentified or unquantified exposures. The U.S. EPA ISCST3 Air Dispersion Model has a 50-kilometer limit. The air dispersion modeling conducted for the health risk assessment focuses on the highest potentially exposed receptors (within 20 kilometers of Deseret Chemical Depot). No changes were made to the HRA in response to this comment.

3y. Comment. The HRA should but does not include an assessment of the total non-local impact of TOCDF emissions of dioxin-like compounds together with existing levels and continuing emissions of such air pollutants from all regional air pollution sources, particularly in light of recent findings in a report by the National Research Council (NRC) that concluded that regional atmospheric transport of persistent organic pollutants from air pollution sources is causing contamination at levels of concern.

Response. The comment does not provide a specific reference for the National Research Council. The health risk assessment was conducted in accordance with USEPA (1998) methods. Please see response to comment 3x.

3z. Comment. The TOCDF HRA should but does not provide a mass balance analysis, accounting for all of the toxic emissions from TOCDF in terms of their ultimate long term fate and public health and environmental consequences, including a mass balance for agent purportedly captured on charcoal/carbon HVAC filters but some of which may have been released from the filter material into the environment, and including a mass balance for mercury and dioxin-like compounds.

Response. The HRA was conducted in accordance with USEPA (1998) guidance that does not recommend a mass balance analysis be conducted. Mass balance work in progress suggests that the USEPA (1998) methods substantially overestimate the concentrations of persistent organic compounds such as dioxins and di-n-octyl phthalate. Mass balance has been considered in the HRA uncertainty section by comparing the total organic emission rate to the sum of the chemical-specific emissions rate in the uncertainty section of the HRA. The HRA did evaluate potential chemical agent emissions from charcoal to the HVAC stack (see Section 2.2.1.4 of Tetra Tech, 2001) using the GB detection limit since no agent has been detected. A mercury mass balance (EG&G, 2002) was performed after the April 2002 draft of the HRA was prepared and the results will be included in the next draft of the HRA.

3aa. Comment. The HRA inadequately considers the impacts of TOCDF lead emissions in combination with other lead emissions sources on children.

Response. No data or rationale was provided to support the assertion that the evaluation of lead was inadequate. The target levels for lead were one-quarter of allowable health-based concentrations in accordance with USEPA (1998). The HRA concluded that lead emissions are below levels of concern. No changes were made to the HRA in response to this comment.

3ab. **Comment.** The HRA inadequately considers endocrine disruption effects of TOCDF emissions alone and in combination with other pollution sources.

Response. No data or rationale was provided to support the assertion that the evaluations of endocrine modulators were inadequate. Noncancer effects, that include endocrine modulation, were evaluated in accordance with USEPA (1998).

3ac. Comment. The criticisms posed by the recent testimony and disclosures of former TOCDF permit coordinator Gary Harris need to be addressed in the HRA including adequate provision for local consumption of locally produced beef, dairy products and vegetables.

Response. The Division interviewed Mr. Harris and local residents during preparation of the *Screening Risk Assessment* (A.T. Kearney, 1996). Mr. Harris's claims during his depositions in 1999 and 2000 regarding the health risk assessment were investigated. The Division has interviewed local residents and reviewed court transcripts regarding consumption of local foods. Fruit trees do not commonly produce because of frosts that can occur in any month (1997 was first year in 20 that apples were produced). Above

ground gardens are limited to cold tolerant vegetables or those vegetables with a short growing season (tomatoes require a greenhouse). Below ground vegetables are common. People in the vicinity of Deseret Chemical Depot raise dairy goats but presently there is no known human consumption of the milk. Other domestic stock identified are geese, chickens, ducks, turkeys, sheep, rams, horses, pigs, buffalo, and beef cattle. Many of these stock are fed commercial feed. Goats, sheep, horses, buffalo, and cattle may consume locally produced feed. The HRA evaluated the consumption of potentially contaminated homegrown beef, sheep, pigs, chickens, eggs, dairy products, fruits, and vegetables at subsistence levels and found the potential health effects to be below target levels. No changes were made to the HRA in response to this comment.

3ad. Comment. The existence of a commercial goat milk/cheese enterprise in the Tooele area was not considered in the HRA but should have been, and could result in a total risk estimate being unacceptable for residents who consume some of the locally commercially available goat cheese.

Response. An evaluation of commercial foods is beyond the scope of the HRA. The HRA did consider the potential consumption of homegrown dairy products from goat's milk that includes cheese. The HRA concludes that the potential health risks from consumption of goat's milk products are below target levels. No changes were made to the HRA in response to this comment.

3ae. Comment. The criticisms posed by the recent testimony and disclosures of former TOCDF permit coordinator Gary Harris need to be addressed in the HRA including assessment of impacts on employees who spend 60 hours or more a week on site at the Depot.

Response. Deseret Chemical Depot firemen and paramedics work 24-hour shifts. Based on this information, the HRA modeled a conservative exposure frequency of 4000 hours per year for the on-site worker scenario and found the health effects to be below target levels. The USEPA default exposure frequency for a worker is 2,000 hours (250 days x 8 hours/day). Notification of the change in exposure frequency was inadvertently omitted from the HRA and will be added to the next draft.

3af. Comment. The risk characterization and uncertainties sections of the HRA need to be centered around and focused on the precautionary principle, rather than blatantly ignoring this principle as is the case with the current BRA. If the evidence indicates a reasonable possibility that harm to human health or the environment may occur from TOCDF emissions, either based on calculations based on known factors or truly conservative assessment of unknown factors, then the burden of proof must be placed on the owner and operator of the pollution source and the facility should fail the HRA. As an example, if there is a scientific basis for believing that certain types of potentially toxic chemicals may be emitted in the TOCDF stack gas as products of incomplete combustion and those chemicals have not been identified or the toxicity of the chemicals have not been identified, then the UDEQ must prohibit operation of TOCDF until all such emissions have been identified and until the toxicity data has been obtained.

Unknowns cannot be assumed to be harmless. If a facility operator does not know the chemicals being fed into an incinerator and/or does not know the chemicals coming out, the facility should fail the HRA and be denied a permit to operate. The potential for unacceptably high health risks to result from emissions of chemicals even at the detection limit was effectively demonstrated in the HRA in its calculation of high risks from DNOP, EMA and 2 PAHs assumed to be emitted at the detection limit. The stack emissions known to occur at TOCDF but yet to be identified clearly cannot be assumed to be harmless.

Response. A qualitative uncertainty analysis that considers the potential emissions of unidentified chemicals was conducted in accordance with USEPA (1998) The conclusion of the HRA is that emissions from the TOCDF, which includes a small fraction of unknown constituents, are below levels that could require modifications to the operating permit issued by the Division. If emissions are determined to be unsafe, the Division will take action to protect human health and the environment. No changes were made to the HRA in response to this comment.

3ag. Comment. The HRA in the uncertainty section or perhaps more appropriately in the main body of the HRA needs to quantitatively as well as qualitatively address unknown or uncertain factors by use of mathematical uncertainty factors of sufficient size and in a manner that allows a mathematical bounding of the risk estimate on the bottom and top. This was not adequately done in the HRA. If this cannot be done, or if the range of potential risks thus bounded exceeds an acceptable risk standard, then the facility should fail the BRA and be denied a permit to operate.

Response. A qualitative uncertainty analysis was conducted for the HRA in accordance with USEPA (1998) guidance. The Division elected not to do a quantitative uncertainty analysis because the information was unnecessary and too resource intensive to generate. No changes were made to the HRA in response to this comment.

3ah. Comment. The HRA improperly disregards the potential for workers to be directly engulfed in the TOCDF stack plume.

Response. Based on the height of the TOCDF common stack, workers are unlikely to be engulfed in the stack plume. The low oxygen content of undiluted stack gases would cause a greater and more immediate hazard to human life than potential exposures to trace amounts of chemicals. The potential for acute exposures assuming some dispersion and dilution of the stack gases was considered in the HRA. Acute exposures were calculated assuming the highest predicted one-hour ground level air concentration. The HRA will add an evaluation of potential acute exposures to VX using the recently released AEGLs.

3ai. Comment. The HRA improperly disregards the potential for workers to bring TOCDF contaminants home with them where a child, infant, or developing fetus may be exposed.

Response. No data or rationale was provided to support the assertion that contaminants are transferred to worker's homes on their clothing. Deseret Chemical Depot has an industrial hygiene program that provides employees education, standard operating procedures designed to minimize the potential for exposures, access to work clothing that remains onsite, and access to showers to minimize the potential for migration of chemicals from the site.

3aj. Comment. The TOCDF human health risk assessment does not use the new increased toxicity estimates and exposure standards for VX announced by CDC and EPA. The Army has "provisionally accepted" the new acute exposure guidelines for VX. The TOCDF human health risk assessment must address this increased toxicity for VX.

Response. The HRA relies on the most recent standards available when the assessment was conducted. The CDC has proposed new airborne exposure limits for VX (FR, January 8, 2002). The HRA toxicity values for chronic vapor exposures were based on the current CDC general population limits (FR, March 15, 1988). The Division has conducted a comparison using the (new) proposed general population limit for VX (FR, January 8, 2002). Predicted exposure concentrations to VX are lower than the proposed general population limit. If CDC's proposed airborne exposure limits are adopted, the HRA conclusion of no adverse health effects from potential exposures to chemical agents will stay the same.

The USEPA finalized the interim acute exposure guideline levels (AEGLs) for VX too late to be included in the April 2002 draft of the HRA. An evaluation of acute exposures to VX will be documented in the next draft of the HRA. The maximum predicted one-hour air concentration for VX is lower than AEGL indicating that potential acute exposures will have no adverse health effects.

4. Comment. Neither the HRA itself nor the state's handling of it adequately promote, provide for, encourage, facilitate or assist the public in understanding the risks posed by the TOCDF RCRA facility or in participating in the state TOCDF RCRA permit decisions in light of those risks

Response. The Division has actively encouraged and facilitated public participation in the risk assessment process. To assist the public and other stakeholders, the Executive Summary of the HRA was specifically written for people without a technical background. The Division conducted separate briefings for the Solid and Hazardous Waste Control Board and the Citizens Advisory Commission. Two public information meetings (an additional one was added in response to a request from the public) were held and Division staff were (and are) available to provide assistance in using the documents. Announcements were sent to everyone on the mailing list for TOCDF issues. The documents were made available on the World Wide Web. The comment period was extended in response to a request from the public. The Division solicited public comment on the HRA protocol prior to performing the HRA and is now soliciting comments on the completed HRA. The Division delayed the permit renewal to give interested parties time to review the HRA.

4a. Comment. Chris Bittner of DSHW in the June 25, 2002 public information meeting asserted that the risk assessment itself need not be written so that lay persons could understand it because "simplicity loses accuracy." But documents that are too technical do not promote legitimacy and accountability in governmental decision-making processes. Public participation documents which are written at too technical a level like this HRA disenfranchise the public and de facto restrict who can participate in the RCRA process, and therefore limiting who can influence that decision- making process. This "draft Human Health Risk Assessment" can be, and should be, more user friendly. If DSHW cannot write the HRA in a manner that preserves technical accuracy and at the same time is understandable by the public, then the Division should pay for an independent technical consultant chosen by the public and concerned environmental and citizen groups to assist the public in understanding this very important RCRA document.

Response. The Division acknowledges that the HRA is a complex document. In order for the HRA to meet its principle function, a tool to assist Division scientist and managers in evaluating the protectiveness of the emissions from combustion sources at Deseret Chemical Depot, it must incorporate modeling and evaluation that is complex to the lay public. A separate goal of the Division is to assist the public and other interested parties in understanding the HRA. The Division specifically wrote the Executive Summary for people without a technical background. The Division also held information meeting and made knowledgeable staff available to answer questions in a group setting or one on one.

4b. Comment. The slides given at Division of Solid and Hazardous Waste Control Board meeting and both public information meetings stated that there are "no regulatory requirements" for doing a HRA and then stated that the HRA is a "DSHW tool for evaluating the protectiveness of the operating permit." The Commentors here take issue with these statements because RCRA and its implementing regulations do require a HRA or its equivalent in some legitimate form to support the required determination that TOCDF does not pose an unacceptable risk to public health and the environment or pose an imminent and substantial endangerment, either during trial burns or operations. RCRA requires long-term operations to be protective of human health and the environment. Trial burns themselves must not present an imminent hazard to human health and the environment. The Utah Court of Appeals has ruled that the State should update its HRA with new information as it is required including the development of or discovery of a dioxin RfD. The "draft human health risk assessment" states: "The objectives of the risk assessment ... (2) cumulatively to provide a basis for evaluating the protectiveness of the operation conditions in the Resource Conservation and Recovery Act (RCRA) hazardous waste permit." See, e.g., Utah Administrative Code R315-3-23; Title 40, Code of Federal Regulations 270.32 (b)(2)); In re Ecolotec (Decision of EPA Administrator).

Response. There is no regulatory requirement that a risk assessment be conducted. The Executive Secretary uses sound engineering judgment, permit conditions which limit waste feed and operating conditions, monitoring of combustion parameters, and other rules applicable to hazardous waste facilities to ensure trial burns are protective. If the

emissions are unsafe, the Executive Secretary will take action to protect human health and the environment. The Division appears to have met the intent of the comment because a HRA was done. No changes were made to the HRA in response to this comment.

4c. Comment. The use by DSHW of certain "draft" reports, documents, etc. and then not using other "draft" reports, documents, etc., such as the EPA Dioxin Health Assessment is arbitrary and capricious. The State's policy on use of drafts has not been disclosed to the public and should be established with public comment pursuant to law.

Response. USEPA guidance documents are not regulatory requirements and the Division has no formal policy for the use of guidance documents, but uses its best judgment in determining the usefulness and applicability of guidance. The Division prefers to rely on USEPA guidance that is final. If applicable guidance is not available in final form, other sources of information and data are considered, including draft guidance. Division staff determines the applicability of the other sources of information on a case-by-case basis when final guidance is unavailable. No changes were made to the HRA in response to this comment.

4d. Comment. The DSHW acts as if draft human health risk assessment is correct as it stands and that public comment is an after the fact formality which is not really wanted but a technical requirement the DSHW must endure. It appears the DSHW has already made its decision re the HRA. There is a difference between "public outreach," which implies a decision has been made and the governmental agency is informing the public of the decision versus "Public participation," which allows for two-way dialogue, consulting, and includes all entities in the decision-making process prior to a decision.

Response. The Division was not required to conduct a risk assessment nor was the Division required to solicit public comment. The Division conducted these activities because the HRA is a useful tool for evaluating the protectiveness of the operating permit and the Division wanted the public to be informed concerning the process and the results. The Division believes that the HRA is reliable for its intended purpose and was prepared in accordance with the USEPA (1998) guidance. The Division would not have released the draft HRA if the assessment was not reliable for its intended purpose. Soliciting public input on the risk assessment methodology for the HRA protocol prior to the preparation of the risk assessment facilitated public participation. The Division did not rely on the findings of the HRA until all comments on the HRA were considered. No changes were made to the HRA in response to this comment.

5. Comment. It is a fallacy to assume that all JACADS, TOCDF and CAMDS trial burn data is equal and has the same kinds of quality control and quality assurance. For example: CAMDS has never completed trial burns under the part B RCRA permit requirements.

Response. No assumption was made that all of the emissions data used were equal in quality. The best available data was used to estimate emissions in the HRA. All trial

burns conducted at JACADS and accepted by USEPA Region 9 were assumed to meet applicable regulatory requirements. All trial burns at CAMDS and TOCDF were reviewed by the Division and met the regulatory requirements for trial burns. CAMDS conducted two test burns under its Research and Development Permit that the Division has accepted as trial burns because they met the standards for trial burns. No changes were made to the HRA in response to this comment.

6. Comment. There is a general assumption that all of the various waste streams for CAMDS and TOCDF have been analyzed for waste characteristics for determining feed rates and emissions for the purpose of this "draft human health risk assessment." This is a fallacy. The Division of Solid and Hazardous Waste staff, during the June 25, 2002, meeting, stated that less than 10% of the VX tons have been analyzed and apparently none of the other VX munitions have been tested to characterize the waste they contain.

Response. For the HRA, the primary purpose of waste characterization is to determine if the trial burn emissions are representative of the waste to be treated. The best available emissions and waste characterization data were used to estimate emissions for the HRA. The emission data and waste characterization assumptions will be updated as new data is collected. In accordance with the Hazardous Waste Management Rules, the waste must be adequately characterized prior to treatment by either generator knowledge or analyses. Additional waste characterization will be conducted on VX munitions that are unsafe to sample in their current configuration (e.g., explosive hazard). If the sample results reveal the waste is not characteristic of the waste processed during the trial burn, a new trial burn may be required. The risk assessment will be revised if new trial burn data is substantially different than the assumptions in the HRA. No changes were made to the HRA in response to this comment.

7. Comment. It is a fallacy to claim all applicable permit modifications of CAMDS and TOCDF have been reviewed (to date) to assure compliance with this "draft human health risk assessment."

Response. The origin of this comment is unclear because this claim is not made in the HRA. Risk assessment is one of the tools that the Division can use when reviewing permit modifications. If a different tool, such as performance standards, is more appropriate for evaluating a permit modification, the Division uses that tool. No changes were made to the HRA in response to this comment.

8. Comment. The "draft human health risk assessment" has no safety margins, error margins and/or default factors for increased feed rates and/or operation production rates. For example: CAMDS is currently in a Class III permit modification process to increase feed rates from 200 pounds to 1500 pound per charge. One cannot assume that a given increase in feed rate will result in linear increase of products of incomplete combustion, and therefore cannot assume a linear change in the risk assessment. It is similar to the analogy of a car going from 20 mile per hour to 80 mile per hour, an increase of four times the original velocity. One might think it takes four times as much energy when, in

fact, it takes about 16 times as much energy, since the air resistance of the car increases as the square of its velocity.

Response. The HRA is based on permitted feed rates or anticipated feed rates. If feed rates change significantly a new trial burn may be required, and the impact on the HRA emission rates will be evaluated. The increase in charge being considered for CAMDS is for bulk metal that is relatively inert. This quantity of metal has been previously demonstrated by CAMDS and the emissions evaluated in the HRA. Therefore, no increase in emissions is expected compared to the emissions modeled in the HRA. No changes were made to the HRA in response to this comment.

9. Comment. What is meant by "warranted mitigation"?

Response. When the health risks are above an acceptable level, risk management or risk mitigation is warranted, or appropriate, to reduce or eliminate the source of the unacceptable risk. If health risks are acceptable, risk mitigation is unwarranted. No changes were made to the HRA in response to this comment.

10. Comment. What will be the effects of upset conditions?

Response. Upset conditions, i.e., operating outside of permitted limits, can result in an increase or decrease in emissions relative to the trial burns. The primary concern is that emissions may increase. USEPA (1998) recommends that a correction factor, that increases emissions, be applied to the emission rates observed during trial burns. This was done for the HRA. No changes were made to the HRA in response to this comment.

11. Comment. What is meant by "defaults"?

Response. Defaults are parameter values used when actual measurements are unreliable or unavailable. Risk assessment defaults are typically intended to be protective, that is, they are more likely to overestimate exposure than to underestimate it. For instance, the USEPA (1998) default beef ingestion rate was used because the actual ingestion rate for the people in Rush Valley is unknown. No changes were made to the HRA in response to this comment.

12. Comment. An explanation must be given for why in each instance the protocol or EPA guidance was not used.

Response. Explanations were given for deviations from the guidance and HRA protocol (Tetra Tech, 2001). The HRA identifies the deviations and provides an explanation in Section 3.3.4 – Modifications in the Procedures for the Risk Assessment. Some explanations were inadvertently omitted and will be added to the next draft (for instance, see response to comment 26).

13. Comment. There is no explanation of EPA's default values that are used sometimes and other times not; nor is there explanation of what the EPA default values are, and how protectiveness levels change in using or not using certain defaults.

Response. The comment does not specifically identify the defaults that are being questioned. Table 5-5 in the HRA protocol (Tetra Tech, 2001) lists the exposure parameters and the source of the values. No changes were made to the HRA in response to this comment.

14. Comment. There is assumption that the "reporting levels" are more protective than the "target levels," and that the range between the two is to prevent exceedance of the "draft human health risk assessment" accepted levels. Yet it appears from what the HRA does and does not state that "warranted mitigation" would not occur until after exceedance of the "target levels." In some cases the "draft human health risk assessment" establishes exceedances that are already occurring or have occurred.

Response. Reporting levels are more protective than target levels by a factor of ten. The chemicals exceeding reporting levels are identified for information purposes because the risks and hazards from those chemicals are approaching the target levels. Mitigation is not warranted for chemicals whose risks and hazards are less than target levels (but may be above reporting levels). Also, please see response to Comment 1a. No changes were made to the HRA in response to this comment.

15. Comment. "Cancer effects" should be clarified in terms of what it includes or excludes (e.g. Soft tissue cancer effects are different that hard tissue cancer effects in regard to short term versus long term).

Response. The HRA does not differentiate based on the severity or type of cancer. No cancers were excluded. All chemicals with an integrated risk information system (IRIS) slope factor or unit risk were assumed to potentially cause cancer. No chemicals were eliminated based on the carcinogenicity classification (for instance, known human carcinogen versus probable human carcinogen). The HRA concludes that cancer risks are negligible, that is cancer risks are below target levels, so the benefit of further characterization of the chemical-specific types of cancer is unclear. No changes were made to the risk assessment.

16. Comment. If TOCDF will be allowed to process multi-agent and/or multi-agent contaminated waste, how does the HRA address this risk when it looks at each agent campaign separately?

Response. The HRA did not evaluate more than one agent at a time. An evaluation of the potential for simultaneous releases of GB and VX was evaluated for the permit modification to process VX and GB secondary waste (Division, 2002). A discussion of this information will be added to the next draft of the HRA.

17. Comment. The HRA references reporting levels and target levels but does not ever really say what the DSHW would consider an unacceptable risk warranting permit denial and at what stage this determination would be made. This should be made explicit.

Response. Neither the Division, nor USEPA, has established a specific target level that would warrant a permit denial. Denial of a permit would take into account other factors, such as an inability to mitigate a credible risk. Also, please see response to Comment 1a. No changes were made to the HRA in response to this comment.

18. Comment. (pg. 2 section 2. 1; par. 3): "Leaking munitions are not handled in the CHB. Therefore, fugitive emissions (to the atmosphere) from the systems are unlikely. Therefore, potential fugitive emissions were not evaluated separately from the TOCDF HVAC system." This statement is factually incorrect. It also makes the assumption that there is no migration of agent into other areas of the facility and/or fugitive emissions into the ambient environment.

Response. Leaking munitions are not handled in the CHB (container handling building) but the overpack containers (for instance, the ONCs) are handled in the CHB. A seal failure on an ONC would need to occur for a vapor release in the CHB. If munitions in an ONC leak, the ONC is not opened in the CHB. Previously leaking munitions in overpacks are not opened in the CHB. No changes were made to the HRA in response to this comment.

19. Comment. (pg. 3 section 2.2; par. 1) "The MPF may also be used to treat debris from the Assembled Chemical Weapons Assessment (ACWA) support work and debris from ACWA research and development that is generated at CAMDS." This makes the assumption that the MPF will be used as a dunnage incinerator. The MPF was not originally for dunnage. It also makes the assumption that all of ACWA waste has been characterized.

Response. The statement was based on information provided by CAMDS. The CAMDS MPF is not permitted to treat dunnage (contaminated wood or charcoal). All waste that is treated must be adequately characterized prior to treatment and have been demonstrated in a trial burn. No changes were made to the HRA in response to this comment.

20. Comment. (pg. 5; table 2-1 first agent for DFS and last detected compounds for unit HVAC): "VS" This is typo; it should be "VX." This is misleading, since there have been problems in the HVAC of TOCDF where compounds have been found. This needs to be corrected.

Response. The typographical error will be corrected.

21. Comment. (pg. 6; continued of table 2-1 first two items under the column "Basis of Emissions Rates): There is no explanation for the statement" default upset correction factors incorporated into Ers." It is not clear what the upset default is.

Response. The USEPA defaults are 1.45 for metals and 2.8 for organics (Section 2.2.5 Emission Process Upsets of USEPA, 1998). Site-specific data was unavailable for CAMDS to estimate the frequency of process upsets, so the USEPA (1998) defaults were used. This information was discussed in the HRA protocol (Tetra Tech, 2001). Also please see response to Comment 11. No changes were made to the HRA in response to this comment.

22. Comment. (pg. 11 section 3.3. 1): "The fate, transport and toxicity of GB, VX and sulfur mustard were quantitatively evaluated with parameter values available in the TOCDF Screening Risk Assessment (A. T. Kearney [Feb.1996)... "It is not clear why the "new" toxicity levels for VX are not included when the Army has "provisionally accepted" them. The "draft human health risk assessment" uses other "draft" reports, documents, etc. The increased toxicity level has been known for over a year.

Response. Please see response to Comment 3q.

23. Comment. (pg. 12; table 3-1): Why does the table state "not applicable"?

Response. Not applicable means that the parameter value is not applicable. No loss constant (variable ksg) is used for the chemical agents. Assuming no loss constant is a protective assumption that all potentially emitted chemical agent accumulates in the environment and undergoes no breakdown. GB and VX are not known to cause cancer so the inhalation unit risk and slope factor (both measures of carcinogenic potency) are not applicable. No changes were made to the HRA in response to this comment.

24. Comment. (pg. 15; third dotted area): "The values for several emission rates were updated to address minor calculation and classification errors. The changes had no significant effect on the magnitude of the risk and hazard estimates reported in the draft human risk assessment report... " These calculation and classification errors should be stated specifically. A clarification should be given as to why these errors did not affect the draft human health risk assessment.

Response. The errors were not tracked, so they cannot be identified. A comparison could be made between the tables in the HRA protocol and the HRA to identify the changes. The errors were of insufficient magnitude to affect the HRA results because of the limited significant figures (two or less) used to report risks and hazards. For instance, if the hazard index is 100 and there was an order of magnitude error (factor of 10) in the emissions for a chemical that the hazard quotient was 0.001, there is no significant effect on the hazard index of 100. No changes were made to the HRA in response to this comment.

25. Comment. (pg. 15: forth dotted area): "Similar to initial assessment of the units at CAMDS, the simple addition of unit-specific risks and hazards for each agent campaign at TOCDF resulted in vast overestimation of cumulative risks and hazards. Therefore, weighted-average, unit-specific emission rates were used to assess cumulative risks and hazards associated with emissions at TOCDF. Emissions rates were weighted based on

the duration of each agent campaign compared with total duration of all campaigns." It is unclear what cumulative risks and hazards for unit-specific have been overestimated and why. There needs to be a detailed explanation of this so that the public can be sure that the reason was not simply that the cumulative risk exceeded the acceptable exposure levels for various scenarios.

Response. A more detailed explanation will be included in the next draft of the HRA. If cancer risks are compared for 1.) 12 years of operation and 2.) adding the cancer risk from four years of operation three times (4 years x 3 years = 12 years), the result is not the same. The cancer risk that was calculated by adding the cancer risks from four years (option 2) are higher, and therefore are overestimates.

26. Comment. (pg. 15: statement before the last dotted area): "In addition to modifications to emission rates, several exposure parameters differ from the values listed in the protocol or are not reported in the protocol." This statement implies that the protocols that were the methodology used for this "draft human health risk assessment" will now not be used. There is no data to justify why the protocols will not be used; nor is there data to support that some other methodology is better to establish protective levels for human health and the environment.

Response. The basis for each new or changed parameter is provided in this section. However, two modifications were inadvertently omitted from this section. This section should refer the reader to Section 3.3.2 for information on the evaluation of the mutton and goat's milk exposure pathways and should include the changes to the on-site worker exposure frequency (please see response to Comment 3ae).

27. Comment. (pg. 18 section 4. 1; par 1) "...assessment of all COPCs, which includes those compounds detected in emission and the non-detected compounds evaluated at the analytical detection limit in the stack gas." It is unclear what is meant by "non-detected"? If non-detected means the compounds did not exist it is one thing, but it is another if the detection equipment was not capable of detecting a compound actually present due to limitation of equipment, or if the compound was not tested for (was not a target analyte).

Response. Non-detected compounds were compounds that were analyzed but were not present in the sample at a concentration greater than the laboratory's certified reporting limit. The compound may be present at some concentration below the laboratory's certified reporting limit or may not actually be present. No changes were made to the HRA in response to this comment.

28. Comment. (pg. 18 last par.): "The 1E-05 value is within the range outlined in the national Contingency Plan and is consistent with existing DSHW rules and policies." It is not clear what rules and policies are being referenced here. The NCP is a set of Superfund regulations, not RCRA. Clarification is needed.

Response. The sentence will be deleted from the next draft of the HRA. Target levels are set at the discretion of the Division (USEPA, 1998). The point-of-departure for

cancer risks are 10^{-4} to 10^{-6} in the Hazardous Waste Management Rules (UAC R315-101).

29. Comment. (pg. 19first par.): "Although no adverse health effects are predicated if the HQ [hazard quotient] or HI [hazard index] is less then 1…" If the HQ is single chemical compounds added together to form the hazard index which equals less than one, this makes the assumption that the hazard index in and of it self is protective. It also makes the assumption that background levels are in and of themselves, equal to less than one. There is also the assumption that background levels are protective, which is a fallacy. In fact some background levels are already too high such that adding any more would increase the body burden, increasing cancers and non-cancer effects, meaning the increase would not be protective of human health and environment. For example: dioxin-like compounds.

Response. A hazard quotient (a hazard index is calculated by summing hazard quotients) is calculated by dividing the calculated dose to a person by the USEPA safe dose (reference dose). If the hazard quotient is less than one, the person's dose is less than the safe dose, so no adverse health effects would be expected. If all of the hazard quotients added together to calculate the hazard index are less than one, no adverse health effects would occur from the exposure to multiple chemicals. The target level for the HRA was a hazard index of 0.25 as a method of accounting for unidentified or unquantified exposures to chemicals (e.g., background levels). The Division has no jurisdiction for exposures unrelated to hazardous waste management activities (for instance, smoking). No changes were made to the HRA in response to this comment.

30. Comment. (pg. 19 first par last sentence): "A calculated endpoint that exceeds the target level does not indicate an unsafe action or unacceptable risk, but indicates that additional evaluation or mitigation is warranted." There seems to be some obfuscation here. The target levels are EPA and reporting levels are the Division of Solid and Hazardous Waste. Target levels would mean that there is unacceptable risk and mitigation is warranted. The "draft human health risk assessment" implies that reporting levels would be an added protective level, which would give time to evaluate and mitigate warranted action before a target level was reached. The statement should read: "A calculated endpoint that exceeds reporting levels does not indicated an unsafe action or unacceptable risk, but indicates that additional evaluation or mitigation is warranted."

Response. The risk assessment evaluated many chemicals, many exposure scenarios, and many furnaces. To condense the results (for instance, the results in the appendices take over 200,000 pages to print), only chemicals that resulted in risks or hazards above the target levels were to be discussed in the text. This approach was inadequate because chemicals that were less than, but approaching, the target levels were not identified. The HRA was changed to include reporting levels for chemicals with hazards and risks that were less than, but getting close to, target levels.
The text describing the target levels is accurate as written (see Section 7.4 of USEPA, 1998). USEPA (1998) does not recommend target level values. The permitting authority, that is, the Division, sets the target level. The target levels chosen are the same

values that were recommended in previous USEPA (1994) guidance for conducting combustion risk assessment. Therefore, the target levels used in the HRA are Division target levels and USEPA (1994) target levels.

The reporting levels are useful for information only. The reporting levels are ten times lower than the target levels. Chemicals that have risks below the target levels but above the reporting levels do not require any additional evaluation at this time. These chemicals may require additional evaluation in the future. For instance, in Table 4-14 of the HRA, mustard is the major contributor to a hazard index of 0.065. If mustard emissions are determined to be four times higher than modeled in the HRA, the hazard index would increase to 0.26, which is above the target level and additional evaluation would be required. Another example would be a determination that cadmium emissions were 10 times higher than previously modeled in the HRA. No additional evaluation would be required to conclude that the risks from cadmium are still below target levels because the risks from cadmium are not currently above the reporting levels (that is, cadmium risks were more than 10 times lower than target levels).

The HRA used the terms USEPA target levels and DSHW reporting levels, even though both are selected by the Division, in an attempt to avoid confusion between target and reporting levels. Additional text will be added to the HRA to clarify the difference between target and risk levels.

31. Comment. (pg. 20 second par.): "Dioxin emission (based on a 2,3,7,8-TCDD TEQ value) from TOCDF for the sulfur mustard campaign present a cancer risk of 3E-06 for the subsistence adult, which exceed the DSHW reporting level of 1E-06." That is not considering that cancer risk is only one of the dioxin problems. EPA and WHO data indicate that the national adult average intake for dioxin TEQ is estimated to be 1-6 picograms per kilogram of body weight per day. Data has established that in rats a single low dose of TCDD on day 15 of pregnancy affected the sexual development behavior and functions of their male offspring. Doses of TCDD as low as 2.5 parts per quadrillion--equivalent to a mere 10 molecules per cell, completely abolish the ability of cultured immune cells to respond to signals to proliferate and mount an immune defense. (Source: Thornton, Joe, "Pandora's Poison: Chlorine, Health, and a New Environmental Strategy," copyright 2000, Massachusetts Institute Technology, page 92). This would imply that current background levels of dioxin TEQs are too high, and any additional dioxin dose would be an excessive body burden and unacceptable risk.

Response. Please see response to Comment 2a.

32. Comment. (pg. 20 section 4.1.1 first par.): "The cancer risk associated with treatment of GB at one or more TOCDF sources exceed the DSHW reporting levels of 1E-06 for adult and child subsistence rancher scenarios, the adult and child resident scenarios and the on-site worker scenario." There was no mitigation to protect the public for excessive risk during the GB campaign. Additional risks were present not addressed in the HRA such as the May 2000 agent release incident, the DFS HDC waste agent releases etc.

Response. The calculated cancer risk of 1E-06 (one in one million) is less than the target level of 1E-05. Therefore, the risk is not excessive and no additional evaluation is required. The release of GB from the DFS in May 2000 and the detections of GB in the HDC bin do not result in an increased cancer risk because GB is not a carcinogen. Exposures from non-routine fugitive emissions, such as emissions from the HDC bin, were not evaluated in the HRA. The CDC evaluated the release of GB from the DFS and concluded that no adverse health effects were likely (http://www.deq.state.ut.us/EQSHW/CDS/CDS_OtherReports.HTM). Based on the monitoring conducted at the depot perimeter, no chemical agents have ever been released at concentrations above the general population limit. No changes were made to the HRA in response to this comment.

33. Comment. (pg. 25 section 4.1.1.2 "VX Campaign" second par.): "Emissions from the TOCDF present the highest cancer risk (7E-05for the adult) and the highest HI (1,400 for the child) for the adult and child subsistence rancher scenarios." It is ironic that the facility and Division Solid and Hazardous Waste staff claim that this "draft human health risk assessment" has no regulatory implications and are in the process of granting the trial burn plans for VX campaign. Yet the "draft human health risk assessment" states on page one that: "DSHW has the authority and the responsibility to establish permit conditions that are protective of human health and the environment." There is no discussion of what is the "warranted mitigation" for this highest cancer risk and/or the highest hazard index. This statement implies that there is currently a violation of state and federal regulatory requirements in that based on the HRA the trial burns themselves are not protective of human health and the environment.

Response. The Division does not agree that the HRA has no regulatory implications because the HRA may be used to support permitting decisions. The Division has stated that there is no regulatory requirement that a risk assessment be conducted. The Division does not rely on the HRA to determine the protectiveness of the trial burns although the HRA supports that the trial burns will be protective. The HRA concludes that several years of emissions from processing VX will be safe. Therefore, the week of emissions during the trial burns will be safe.

The HRA concludes that potential exposures to emissions from the TOCDF and CAMDS are safe. Therefore, no mitigation is warranted. The Division will continue to collect data (for instance, VX trial burns and monitoring for contaminants in the soil around Deseret Chemical Depot) to verify the HRA assumptions and confirm that chemicals are not being released at unsafe levels. No changes were made to the HRA in response to this comment.

34. Comment. (pg. 2 7 section 4.1.1.3 second par.): "For the subsistence rancher adult and child scenarios, emissions from the DFS, LIC 1, MPF, and LIC 2 units at TOCDF present cancer risk and HI values that exceed the DSHW reporting level and the US EPA target levels." Same as the prior comment.

Response. Please see response to comment 33.

35. Comment. (pg. 35 section 4.1.3.5): "The DFS and MPF present HI values for the adult scenario that exceed the DSHW reporting level of 0.025 as well as US EPA target level of 0.25." This statement implies that there already is an exceedance and that further processing at TOCDF and CAMDS would not be protective of human health and the environment.

Response. In the absence of any further evaluation, the conclusion would be correct. However, after additional evaluation (see Section 4.3.1.6), the calculated hazard indices were determined to be overestimated. Data from environmental monitoring will be collected to confirm that mercury emissions are safe. No changes were made to the HRA in response to this comment.

36. Comment. (pg. 38 Table 4-13, and pg. 39 Table 4-14): The tables should be further clarified and explained. They seem to imply that there are several units that are exceeding in cumulative cancer risks.

Response. The request of additional clarification is unclear. Table 4-13 is discussed in Section 4.1.4.2 of the HRA. No operating scenario in Table 4-13 exceeds the cancer risk target levels. Table 4-14 is discussed in Section 4.1.4.3 of the HRA. No operating scenario in Table 4-14 exceeds the cancer risk target levels. There is little to discuss when the calculated risks and hazards support that there will be no adverse health effects. No changes were made to the HRA in response to this comment.

37. Comment. (pg. 40 section 4.1.5 first par.): "Risk to nursing infants was evaluated by comparing the modeled intake rate 2,3,7,8-TCDD TEQ in breast milk to the 6 picograms per kilogram body weight per day (pg/ kg BW-d) reporting level established by DSHW. The value is 10 percent of the average background exposure level reported by U.S.EPA." This is not the same formula used for other chemicals for the reporting levels based on toxicity. If the same formula was used for other chemicals for the reporting levels based on toxicity the 6 picograms per kilogram body weight per day would be too high by 60 to 100 times or more. It is ironic that the Division uses some "draft" reports, documents, etc. from other governmental agencies, but will not use the final Agency for Toxic Substances and Disease Registry (ATSDR) Tox profile for dioxin. ATSDR has a final report where the MRL is six times lower (1 pg/kg BW-d) and more protective of the breast feeding infant. ATSDR's purpose is to protect public health and the environment. It is mystifying why the Division of Solid and Hazardous Waste will not take this more conservative approach to breast feeding infants.

Response. Dioxins were evaluated in the HRA in accordance with USEPA (1998) guidance. The comment is correct in noting the inconsistency with the terminology. The text will be corrected to indicate that the target level for potential dioxin exposures to a nursing infant is 10 percent of background exposure. Also, please see the response to comment 2a.

38. Comment. (pg. 40 section 4.1.5 par. 2): "The calculated intake rates for 2,3,7,8-TCDD TEQ for each source are less then the DSHW reporting level of 6pg/kg BW-d for all scenarios evaluated, indicating dioxin emissions do not present a risk to a nursing infant." This statement is scientifically indefensible and is an attempted fraud on the public.

Response. The evaluation of potential infant exposures to dioxins is scientifically defensible and consistent with USEPA (1998) guidance. There was no attempt at fraud because the uncertainties associated with the methodology were identified (for instance, see response to comment 2a). To avoid confusion the HRA text will be revised similar to the following. "The calculated intake rates for 2,3,7,8-TCDD TEQ for each source are less than the target level of 6 pg/kg BW-d for all scenarios evaluated, indicating that the potential dioxin exposure to infants from emissions from the TOCDF and CAMDS are insignificant when compared to background exposures."

39. Comment. (pg. 42 section 4.1.7): The discussion in this section is some what misleading. (1) There is no accounting for the increased toxicity level for VX. (2) There is no information for the determination for error factors, margin of error, safety factor for approximately 30 times or more increase for toxicity of VX. (3) There is no analysis for upset conditions, power outages, etc. for inhalation hazards. (4) There is no analysis for evaluation of inhalation hazardous for VX and another chemical agent (eg., GB contaminated secondary waste).

Response. Please see response to Comment 3q for the issue of new or revised VX toxicity values. Upset conditions were evaluated (see Section 2.4.5.3 in the HRA protocol [Tetra Tech 2001]). The potential simultaneous exposures to GB and VX were evaluated for a multi-agent monitoring permit modification and were found to be safe (DSHW, 2002). This analysis will be added to the next draft of the HRA.

40. Comment. (pg. 43 section 4.1.9); "For the sulfur mustard campaign at the TOCDF, dioxin risk slightly exceeds the DSHW reporting level for the subsistence rancher adult for the LIC I unit (1E-06) and LIC2 unit (1E-06)." The word "slightly" is propaganda. The fact is there is an exceedance.

Response. The word "slightly" is accurate in this context because the calculated risks were greater than 1E-06 and less than 2E-06. No changes were made to the HRA in response to this comment.

41. Comment. (pg 44 the first full paragraph and all dotted sections prior to the section 4.1.0): "In 2000, the Science Advisory Board of the U.S. EPA proposed new dioxin cancer slope factor ... which is 6.67 times more stringent the current cancer slope factor [emphasis added] ... new proposed slope factor indicates ... exceedances." This statement is true. This cancer slope factor also reflects, taken with the dioxin dose the infant receives, that the breast fed infant is subjected to an unacceptable cancer risk as well as unacceptable non-cancer health risk from dioxin. There is no discussion of what will be done for warranted mitigation if the new dioxin cancer slope factor is adopted. RCRA

requires that the most protective methods be used. The Division of Solid and Hazardous Waste is required to investigate implementation time lines for alternative technologies for TOCDF that pose less risks. TOCDF and CAMDS, must be required at a minimum to mitigate the unacceptable cancer risks reflected in the use of the new slope factor.

Response. The Division will evaluate the impacts of a revised cancer potency for dioxins if the USEPA adopts a new slope factor or inhalation unit risk. Section 4.1.0 discusses some of the implications if the new slope factor is 6.67 times higher than the current slope factor. The conclusions of this evaluation of the higher proposed slope factor are that the cancer risk will still be less than target levels and no additional evaluation is required with the exception of the emissions from the CAMDS MPF and DFS. The majority of 2,3,7,8-TCDD toxic equivalents estimated for the CAMDS sources are based on non-detected congeners. The Division anticipates that when future trial burns are conducted for CAMDS, the estimates of dioxin emissions estimates will be lower due to improved analytical capabilities. No changes were made to the HRA in response to this comment.

42. Comment. (pg. 44 section 4. 1.10): "The maximum concentration of lead in on -site and off-site soil were identified from the cumulative risk and hazard analysis described in section 4.1.2" Section 4.1.2 only discusses COPC; no heavy metals were include in the discussion in section 4.1.2. Clarification is needed.

Response. The text will be corrected to reference the reader to Section 4.1.4 instead of 4.1.2. Note that Section 4.1.4, Cumulative Risks and Hazards, also only discusses COPCs. Lead is one of the COPCs and is included when the term COPCs is used. The reference is intended to clarify that the lead estimates are not based on emissions from a single agent campaign, but cumulative emissions for the life of TOCDF and CAMDS.

43. Comment. (pg 45 section 4.2): "The uncertainty analysis was performed to (1) identify major uncertainties associated with the risk and hazard estimates, (2) evaluate the effect of the time period of combustion on the estimates of the risk and hazard, and (3) evaluate the significance of COPCs that exceed the DSHW reporting levels and the US EPA target levels." The section needs to be made more lay person user friendly.

Response. The Division will attempt to clarify "difficult to read" text as the HRA is finalized.

44. Comment. (pg. 45 section 4.2. 1): "Major uncertainties associated with the risk estimates were identified the three main parts of the risk assessment: (1) estimates of emission rates, (2)exposure assessment, and (3) toxicity assessment." This requires clarification. What are the major uncertainties? Why are these considered major and other factors not?

Response. The major uncertainties are summarized in Table 4-19 Major Uncertainties in TOCDF Health Risk Assessment. The major uncertainties are the uncertainties that the Division has judged to be the source of the majority of uncertainty in the risk assessment

process. The process was qualitative and based on USEPA (1998) guidance, professional judgment, and experience. Table 4-19 show the anticipated direction of bias (e.g., underestimated risk) introduced due to the uncertainty. The USEPA (1998) methodology is more likely to overestimate risks than underestimate, so the discussions in Section 4.3 focus on chemicals that the calculated risks or hazards are approaching or exceed target levels. No changes were made to the HRA in response to this comment.

45. Comment. (pg. 47 section 4.3.1): This section has many of the same problems as the above two sections on uncertainties. Clarification is needed.

Response. The Division will attempt to clarify "difficult to read" text as the HRA is finalized.

46. Comment. (pg. 51 section 4.3.1.6): This section make a big assumption that the TOCDF and CAMDS will be operating within their permits. Also, this section makes the assumption that there are no fugitive emissions that are being released directly into the ambient environment, which is false. There needs to be some ambient air monitoring for mercury such that background levels can be determined, to assure that both TOCDF and CAMDS will not be exceeding the ambient air limits for mercury. All waste streams (as RCRA requires) need to be characterized before being processed. Neither TOCDF nor CAMDS should be allowed to estimate, average, guess, etc., via use of historical data what is in the waste that is being processed at these facilities.

Response. The HRA does make the assumption that the facilities will operate within their permit limits except for the inclusion of upset-adjustments to emission rates. As discussed in response to comment 3a, fugitive emissions are not expected. The HRA focuses on long-term operations and potential long-term exposures. From a long-term perspective, fugitive emissions from the TOCDF or CAMDS are insignificant because of the engineering controls. The HRA concludes that potential mercury inhalation exposures are safe. The concern with mercury is with fish ingestion, and fish are being monitored. Documented generator knowledge, such as the use of a MSDS or historical sampling, is an acceptable method of waste characterization (UAC R315-5-1, CFR 262.11).

47. Comment. The Division of Solid and Hazardous Waste should have their staff (Chris Bittner) stay consistent with page one of "draft human health risk asessment" which states: "The objectives ... cumulatively to provide a basis for evaluating the protectiveness of the operating conditions in the Resource Conservation and Recovery Act (RCRA) hazardous waste permits for TOCDF and CAMDS..." and not claim there is no regulatory requirement. There seems to be no reason for the Division of Solid and Hazardous Waste to have spent approximately $200,000 of TAXPAYERS' MONEY for something that did not have a bearing on the Division's regulatory and statutory requirements.

Response. The Division uses the HRA as one of the tools to evaluate the protectiveness of the operating permit, so the HRA may have bearing on decisions regarding the permit.

The Division can and does rely on other tools, such as performance standards or compliance with the hazardous waste management rules, in evaluating the protectiveness of operating permits. There is no regulatory requirement that a HRA be conducted (see Chapter 1 of USEPA 1998). No changes were made to the HRA in response to this comment.

48. Comment. Consistency in methodology of calculations of compounds is very important. By not using the protocols consistently it causes a lack of faith in and presumption of bad faith by the Division of Solid and Hazardous Waste. The use of some "draft" documents, reports, etc., versus the use of other "draft" documents, reports, etc., is also bad faith. The Division has no policy on the use of "draft" reports, documents, etc. It is also bad faith by the Division of Solid and Hazardous Waste to use some "new proposed" limits and not other "new proposed" levels.

Response. Please see response to Comment 4b

49. Comment. The use of reporting levels and target levels is obfuscated by not discussing what type of warranted mitigation will be done. There is no discussion that some of US EPA target levels are default levels. There is no mention of the fact that some of the compounds mentioned in the "draft human health risk assessmen" are already at too high an exposure level, and adding more to the ambient environment would be unacceptable. This means that there will be an increase in cancer and non-cancer effects in the population.

Response. Mitigation is determined on a case-by-case basis. Currently, no mitigation is necessary, although the Division is conducting a more detailed evaluation for some chemicals by conducting environmental monitoring and additional waste characterization. As discussed in response to comment 30, the target levels are set at the discretion of the Division. The HRA was conducted in accordance with USEPA (1998) guidance that does not include an evaluation of other sources of exposure. For example, evaluating exposures to other carcinogens such as alcohol and tobacco is beyond the scope of the assessment and jurisdiction of the Division. No changes were made to the HRA in response to this comment.

50. Comment. There is no discussion of how current modifications of both CAMDS and TOCDF affecting this "draft human health risk assessment" and risk. There is the assumption that any modification would have a linear effect, which is a fallacy. There is no mention of upset conditions. If there are currently risk exceedances, then the Division of Solid and Hazardous Waste must not permit continued operations and/or production of either CAMDS or TOCDF. Additional operations will not be protective of human health and environment.

Response. The Division disagrees with the comment. Risk assessment is an ongoing activity at the Division. The assessment is revised as new information, such as permit modifications, becomes available. Periodically, the revisions are documented in a formal document such as the 2002 HRA. The Division conducts evaluations of permit

modifications as they are submitted (e.g., see DSHW, 2002). Upset conditions are discussed in the HRA protocol in Section 2.4.5.3 Process Upset Emission Rate Correction (Tetra Tech, 2001). The current operations at the TOCDF and CAMDS are protective of human health and the environment.

51. Comment. Totally separate from any discussion of the science around any particular chemical of concern, I think that using "safe" to mean " no regulatory action is required" can be misleading. "No regulatory action is require" means that the present level of science does not detect a health risk and /or the current political situation is not conductive to regulation. Exposure to combustion products of chemical weapons does not enough human history for us to have an easy and common expression to describe the imponderables that science will reveal at a future time or current political and physical realities. The word "safe" does have a long human history and is a common expression. We do have words like "unregulated" and "not-regulated" that could be more accurately applied to the meaning of "no regulatory action is required". If the word "safe" is the word that is comforting to concerned citizens, I believe it would more fully convey that the word safe is not being used in the common, long time usage, if it was consistently coupled with a modifier, for example "considered safe". I think language is important because it affect the way citizens, regulators, and the regulated community think about issues. Politically correct language can be overdone and become ridiculous, but it also can accurately reflect and drive changes in our awareness.

Response. The Executive Summary will be revised using the phrase "considered safe" instead of "safe".

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